

**ACADEMIC COUNCIL
MEETING of March 18, 2010
McKenna Auditorium
3:30 p.m. – 5:00 p.m.**

Members present: Panos Antsaklis, Kevin Barry, Robert Bernhard, Ryan Brellenthin, Seth Brown, Thomas Burish, Laura Carlson, Rev. John Coughlin, O.F.M., Greg Crawford, Neil Delaney, Dennis Doordan, Stephen Fallon, Mary Frandsen, John Gaski, Nasir Ghiaseddin, Thomas Gresik, Paul Huber, Dennis Jacobs, Lionel Jensen, Peter Kilpatrick, A. Graham Lappin, John LoSecco, Kelly Martin, Chris Maziar, Kathleen McDonald, John McGreevy, Nell Newton, William Nichols, Hugh Page, Cathy Pieronek, Rev. Mark Poorman, C.S.C., Donald Pope-Davis, Joseph Powers, Ava Preacher, J. Keith Rigby, Grant Schmidt, Cheri Smith, Greg Sterling, Ann Tenbrunsel, Julianne Turner, Carolyn Woo,

Members and Observers excused: John Affleck-Graves, A.J. Bellia, Glynnis Garry, Rev. John Jenkins, C.S.C., Michael Lykoudis, Scott Monroe, Susan Ohmer, Bill Rayball, Jim Seida, John Welle, Jennifer Younger

Observers present: Dale Nees, Harold Pace

Observers absent: Kevin Barry, Brandon Roach, Daniel Saracino

Guests: Angie Chamblee, Rev. Richard Bullene, C.S.C, Steven Buechler, Matthew Gursky, Elizabeth Mazurek, Andrew Sommese

1. Welcome and opening prayer: As Father Jenkins was not in attendance, Provost Tom Burish opened the meeting at 3:32 p.m., welcoming members, and invited Prof. Lionel Jensen to give the opening prayer.

2. Approval of minutes:

The minutes of the February 25, 2010 meeting were unanimously approved.

3. Proposal: New Masters' Degree in Classics

Prof. John LoSecco, chair of the Advanced Studies Committee, briefly recapped the committee's process for approving the proposal for a new masters' degree in Classics. He indicated that the committee was impressed with the opportunity to enhance undergraduate education through the addition of more discussion sections and to strengthen several PhD programs already present in the Humanities with the addition of this program. It requires no new faculty appointments and has a reasonable budget for TA support and introduces only 4 new courses. The subcommittee voted unanimously to recommend that the full Council consider the proposal.

He then introduced Prof. Elizabeth Mazurek and invited her to review the proposal for a new masters' degree in Classics. Prof. Mazurek thanked members for allowing her to appear today to present the proposal. She also thanked Dean Greg Sterling and Prof. Ed Maginn for assistance in drafting the tightly argued proposal. She thanked Dean John McGreevy for advice and mentoring and for financial support and, finally, she thanked Classics department colleagues who were instrumental in bringing this proposal to fruition.

Prof. Mazurek stated that this proposal is the culmination of several years of discussion in Classics about the advisability and feasibility of a graduate program in Classics at ND. This discussion reached a pitch with the external review committee, 2008; the review strongly urged that Classics develop its own masters program in Classical studies in order to provide a coherent foundation of course work to students interested in pursuing doctoral work in a variety of humanistic disciplines. Classical studies is traditionally understood to embrace the language, literature, history, art, archeology, philosophy, science and religion of the ancient Greeks and Romans from the Bronze Age to the later Roman Empire. It is by nature interdisciplinary and chronologically wide ranging. So a student who completes a masters degree in a typical two year program will have a firm understanding of the languages, historical periods and topics in this very broadly defined ancient Mediterranean world. Prof. Mazurek quoted two colleagues—Prof. Remie Constable and Prof. David O'Connor-- in the College who see this program as a potential prerequisite for application to the PhD programs in their respective fields.

Prof. Mazurek provided some data to give members a sense of how much graduate education has grown in Classics since 2006, prior to this program's launch. In 2006 Classics offered nine graduate level courses with a total enrollment of 67 students. In 2009 Classics offered 12 graduate level courses with an enrollment of 114 students. This data represents a 33% growth in curriculum and a 70% increase in enrollment. Graduate students in those related fields are increasingly coming to take Classics courses.

Prof. Mazurek said that this new program will require no new faculty, no new hires, and no major curriculum expansion beyond two new survey courses in Greek and Roman literature and an advanced topics course in ancient history seminar. No new resources in the library are required. The significant resources that will be needed will go toward tuition fellowships and fellowship stipends for incoming students. The stipend work to be done by students will involve teaching beginning sections of Latin and Greek or running discussion sections for Classics' very large first year courses in Ancient Greeks, and Rome and Greco-Roman Mythology. Classics hopes to begin advertising the program immediately and to recruit the first class of graduate students for the Fall 2011 semester.

Tom Burish thanked Prof. Mazurek for her presentation and opened the floor to questions.

Prof. Graham Lappin asked about the teaching role of the graduate students. He wondered whether this is a 'creeping policy' of having graduate students teach first year courses in the university. Prof. Lappin recalled that the expansion of the faculty in the College of Arts and Letters several years ago occurred precisely because the resources of teaching and research faculty for first year courses was judged to be too low. Prof. Lappin asked if the involvement in first year course teaching of the teaching and research faculty in Arts and Letters is diminishing.

Prof. Mazurek said she could only respond from the perspective of the Classics department. The training of these students in the masters' program would include the absolutely standard requirement that graduate students would do some kind of teaching, whether teaching a section of a language or leading a discussion section or acting as a grader for a survey section. Prof. Mazurek noted it would be almost remiss of Classics not to give graduate students some exposure in the pedagogical realm at the same time that they are taking courses. She explained that Classics already depends on teaching assistants from other masters' programs, such as the Medieval Institute, Philosophy and Theology for staffing some of its Greek and Latin courses. The demand for Latin and increasingly for Greek is such that the department needs to offer a number of these courses, and they provide the graduate students in those other disciplines good teaching experience, which, again, is standard in those disciplines.

Prof. Lionel Jensen thanked Prof. Mazurek and her Classics colleagues for a strong proposal. He made several suggestions for fine tuning the proposal.

1. Prof. Jensen pointed to the section on page 5-6 which refers to the current quality of undergraduate education for students who are graduating and moving on, with no graduate program here to attract them. He asked about tracking data on how undergraduate Classics graduates fare in graduate work done at other institutions. He suggested that including such data might correct a vague statement that 'we anticipate them to do well' and would provide a clear marker for future data comparisons, showing that the new graduate program will be building on an already well established foundation with the faculty and programs which are already in place. Prof. Mazurek said there is data from past years of numbers of graduating Classics majors who are going on to masters and PhD programs in Classics; this number is going up. In a good year there may be five or six graduates entering graduate programs elsewhere—this is a significant number for this field. The average is three to four a year. Further, ND students do well in graduate Classics programs at other institutions; they are accepted and they are awarded fellowships. In terms of the anticipated master's program graduates, Prof. Mazurek said that the benchmark is the success of master's program graduates in the field of Early Christian Studies, who move from ND's masters program to elite PhD programs and succeed there.

2. On page 10, Prof. Jensen inquired about the planned program review stipulated in the proposal. He suggested that it might be helpful to review the program sooner than the indicated five years.

In light of concerns about graduate student teaching loads as well as the increase of 60% in enrollment, in a context of no other investment in the program besides graduate students, then reviewing the program in terms of resources perhaps ought to be done sooner rather than later. If further investment were needed, if 'you need help' Prof Jensen suggested, it would be well to know. Prof. Jensen described the results of a review after three years as an 'early portrait of how it is going' which could only be beneficial. A five year review could still be executed as well as the seven year department review.

3. Prof. Jensen asked about the manner of assessing the proficiency of incoming students in Latin and/or Greek since these students might be teaching languages to undergraduates, and some may begin that teaching prior to the end of the four semester sequence of graduate level language training in which they will be enrolled. Under these circumstances, it would be imperative to identify proficiency levels to ensure that any graduate student who is teaching is proficient. Prof. Mazurek agreed that would be necessary. While the department has not discussed the manner of establishing proficiency, she said that it is likely there will a diagnostic exam administered to all incoming graduate students. Students will come into the program with a typical undergraduate level of proficiency, and the expectation is that at the end of four semesters of further study, proficiency would be at a much more advanced level. Prof. Jensen stressed that his concern lies with the possibility that graduate students might be used earlier than anticipated to teach undergraduate courses, due to the growing numbers of enrollments, and that they might possibly not be adequately proficient to do such teaching. Prof. Mazurek replied that Classics already has an established protocol for vetting the graduate students from other disciplines who teach as TAs for Classics courses.

4. Prof. Jensen asked for clarification about the stated 'option' to earn the masters by writing a master's thesis. What other options exist to earn the degree? Prof. Mazurek explained that the master's thesis option is included as a choice for those graduate students who are planning to go on for PhD work in Classics or a related discipline. All students would take a final masters exam; students choosing to write a master's thesis would take fewer courses while writing the thesis. The hours toward degree are similar, but accrued differently.

5. Prof. Jensen asked about including as an appendix the proposed comprehensive reading list noted in the proposal. He solicited Dean McGreevy's opinion on the appropriateness of disseminating the reading list. Dean McGreevy said he was comfortable with the Classics department making that decision. Prof. Mazurek said that Classics has a standing reading list for the PhD in Literature program which could be 'put on the table right now.'

Prof. Mazurek added that on the question of the proficiency in Latin and/or Greek of incoming graduate students, any student entering with an undergraduate degree in Classics from an accredited institution should be proficient to come in and teach. She added that the department

already has in place a faculty mentor for all TAs who sets up the syllabus, devises and posts online all quizzes and tests, and meets regularly for pedagogical discussions with the TAs. They are systematically guided through their first year of teaching. Prof. Jensen asked about the feasibility of a placement test on arrival, so that there is a benchmark standard for language proficiency level for teaching. Prof. Mazurek said she would be more comfortable with the method now in place, which includes looking at a student's coursework and gathering recommendations of former professors. She said any addition to this procedure she would be more comfortable labeling a diagnostic exam. Prof. Jensen agreed to this concept. Dr. Burish asked Prof. Mazurek if she accepted this friendly amendment, to which she said she would want the Classics department faculty to discuss and vote on any firm structure of diagnostic exam. Dr. Burish clarified that Prof. Mazurek's preference today would be to vote on the proposal as it stands, with the understanding that the faculty would later discuss and determine a proficiency test procedure. Prof. Mazurek concurred with that statement.

Dean McGreevy spoke briefly about the concerns which have been raised by Professors Lappin and Jensen concerning standards for graduate student teachers. Noting that the concerns raised are meaningful ones, he addressed the question of whether this proposal represents a potential harm to undergraduate education. He said "One of the attractions of the proposal is that it will help undergraduate studies." The status quo, a result of having insufficient teaching and research faculty to teach undergraduate sections of Introductory Latin and/or Greek, is that those course sections are taught by TAs. The current TAs, however, are not majors in Classics, but have Latin/Greek 'on the side' so to speak, which results in a less-than-ideal situation. A master's in Classics will provide more control over this teaching situation. One reason Dean McGreevy has supported this proposal is because it will improve undergraduate teaching.

Dean Greg Sterling, Graduate Studies, addressed Prof. Jensen's concerns with a diagnostic exam. He noted that Classics language training is a 'different beast' than in modern languages such as, say, Romance Languages or Asian languages. The dynamics are quite different. The department is, therefore, currently doing a very good job of analyzing students' capability of being able to teach effectively; the question which primarily needs to be addressed is pedagogic prowess rather than of their knowledge of the basic grammar etc., which is assuredly of college graduate proficiency.

Dean Sterling also addressed the question of appending a reading list to the proposal. He noted that it is likely the Classics department will devise two reading lists, one which supports a masters concentrating in Latin and the other supporting a masters concentrating in Greek. The choice of titles for each is presumably best left up to the department; Prof. Jensen concurred.

Prof. Joseph Powers asked for clarification of the kind of teaching responsibilities which are expected of incoming first year graduate students; he noted that Engineering graduate students would not be expected to assume teaching responsibilities until perhaps the fifth year. Prof. Mazurek said that the primary focus of the program is an academic course of study for the

education of graduate students. Beginning teaching experiences would include grading and discussion leading; not until the second year would graduate students be given the primary responsibility for lecturing and grading. This represents a standard procedure in the discipline.

Prof. Doordan asked whether support of this proposal represents a change in the university's support of terminal masters programs. It has been his impression that previously there has not been a lot of support of master's only programs. Dean McGreevy said that in the big picture of the College of Arts and Letters, PhD programs 'drive' the reputation of the College and enable ND to position itself as one of the great research universities. Therefore, the vast bulk of resources has gone, and will continue to go, toward advancing the PhD programs. Nonetheless, the success of a few well targeted master's programs in the humanities, such as the masters program in Romance—which is the biggest—has had the very happy function of getting departments better teachers for some of the undergraduate sections of large introductory courses. In addition, they have enabled ND to develop a rich program at the master's level leading to placement of those masters students in some of the very best PhD programs in the country. This has proved a good model for Romance, for instance, providing a good way to build into the PhD in literature. The master's in Classics is going to have some of the same dynamics. However, Dean McGreevy does not see this as a larger pattern for the College; it is a targeted and carefully designed program which is not going to require much additional financial resources. For all of these reasons, Dean McGreevy was in support of this masters program.

Dean Greg Sterling also commented on Prof. Doordan's question about terminal masters programs. Dean Sterling has often stated that PhD programs are the primary focus of the graduate school and they remain as such. This program, which he is in support of, will strengthen the PhD programs. It will play a role for doctoral students in a number of other departments (Political Science, Theology, Philosophy, Literature, and History) where a Classics background is needed. As a faculty member, he believes it 'becomes a matter of recruitment' for graduate students and the quality of training that can be provided to them. It will enhance the attractiveness of these other programs. Dean Sterling would agree that if asked to choose between them, a master's program in Classics is more desirable in the current climate than a PhD program. Indeed, PhD programs in Classics are declining rather than expanding across the country. This masters program will allow ND to support existing PhD programs, it plays to the strength of the faculty in Classics, and it does all of this with minimal costs.

Prof. Paul Huber asked if there will be an active tracking of the outcomes for the prospective graduate students to judge its success. Prof. Mazurek said that as a matter of course the students' post graduate experiences would be tracked, as are the graduate students in Early Christian Studies and the undergraduate students.

Prof. Panos Antsaklis expressed concern about the number of new students in proportion to the number of new courses being added. Prof. Mazurek clarified that the four new courses will be taken by a number of graduate students from other programs and the graduate students in the other masters program in Early Christian Studies, which is a joint master's with Theology, as well as the four new Classics students. She noted that advanced undergraduate students might also take these graduate courses.

As there were no further questions or comments, Dr. Burish asked Prof. Jensen whether he is formally asking for changes to the proposal. Prof. Jensen said that while he likes the proposal overall, he would like a response to his questions and believes the changes he is suggesting ought to be included in the final proposal. Dr. Burish said the proposal could be put to a vote, or he invited Prof. Jensen to briefly propose some specific sentences which could be discussed as prospective friendly amendments to the proposal.

Prof. Jensen offered some emendations to the wording of the proposal.

1. on page 6, on the breadth and depth of training of students:

"The previous success of the undergraduate program in the preparation of students for graduate study..." at this point, Prof. Jensen suggests inserting a sentence which refers to data (in a table perhaps) on the institutions to which undergraduates have gone for graduate study. The sentence would then conclude with the clause, "It is reasonable to expect that ND's masters students would be accepted at the best classes and PhD programs elsewhere." Prof. Mazurek accepted this friendly amendment, with the addition of data from the Early Christian Studies masters students also.

2. on page 10, on the program review:

"Consequently the department would conduct an internal review of the program after year four." Prof. Jensen and Prof. Mazurek agreed on the appropriateness of an internal review, as opposed to an external one, and that more useful data would be obtained after four rather than three years. Prof. Mazurek accepted this friendly amendment.

3. on page 10, on exams:

Prof. Mazurek did not accept Prof. Jensen's suggestion that a diagnostic evaluation be conducted of incoming students' language proficiency. The department's current protocol (specified above) is preferable. The amendment was not accepted. Prof. Jensen was satisfied with the discussion.

4. in the appendix, on the subject of a reading list:

Prof. Mazurek was happy to append to the proposal the current reading list for the PhD in literature program.

Prof. Jensen thanked Prof. Mazurek for her willingness to consider these friendly suggestions for strengthening a very good proposal.

Members were unanimously in favor of the proposal as so amended.

Dr. Burish thanked Prof. Mazurek for her presentation.

4. Proposal: Creation of the Department of Applied & Computational Mathematics and Statistics

Dean Greg Crawford introduced Prof. Steven Buechler, the new chair of the proposed department of Applied and Computational Mathematics and Statistics (ACMS), and Prof. Matthew Gursky, the new chair of the department of Mathematics (MATH). He noted his pleasure in presenting this proposal to create a new department, ACMS. He gave an overview of his presentation: he will address questions which have arisen, then provide a sense of the process undertaken, and take questions at the end.

QUESTIONS:

1. Is there a campus need?

Qualitative analysis and statistics and analytics have become a significant part of many disciplines. It is no longer just Engineering and Physics and Chemistry. In the last 10-15 years, it has become a significant aspect of Biology—computational and systems biology, genomics and proteomics are all very quantitative. Economics has gone to econometrics in a significant way, and quantitative and experimental Psychology use a lot of quantitative and statistical algorithms. The social sciences, such as Political Science and Sociology for example, have been moving toward quantitative work in their research methods. In all these various fields, statistics and applied mathematics and computation are involved. In Business, the new trend is to compete on analytics; so too in Law, as in modeling intellectual property portfolios.

Statistics at ND has had a weakness for some time, so there is currently a hole here in terms of the need for statistics. This need has been discussed for some time, but there have not been a sufficient number of statisticians on campus. While performing some due diligence around campus and considering the need for statistics, looking at the social sciences and biology and other disciplines, there was also a need to get some research assistance in the areas of computation and applied mathematics. The ACMS department will create a collaborative infrastructure that will be cross departmental and cross college, enabling many disciplines to move in a quantitative direction.

The proposed new department is also consistent with other large initiatives on campus, such as the many SAPC projects in terms of its collaborative and interdisciplinary effort, Innovation Park, collaborations with IU School of Medicine and an even larger collaboration, the Indiana Clinical

Translational Sciences Institute, and the Esteem program to name a few of the collaborative and/or interdisciplinary initiatives on campus.

2. Will it bring a new dimension of excellent scholarship to campus, education, faculty, students, and graduate students?

There are several dimensions to think about in terms of improving scholarship and supporting excellence here. It will bring in statisticians to build in an area of need at ND. The ACMS department will also be a strong recruiting tool for collaborative hires across colleges and departments. For instance, the College of Science worked together recently with the College of Arts and Letters on the hiring of a sociologist. Joint appointments are attractive to contemporary faculty members, as many faculty like to be involved with multiple departments and/or colleges. For example, we were able to attract Prof. Greg Timp to Engineering and Biology, who was a great addition for ND. It will also be attractive to graduate students interested in applied mathematics and computational statistics; there are students currently applying to both Economics and the Math department here at ND. The potential for cross collaboration is already there. It will bring a much needed ACMS degree option at the undergraduate level and, more importantly, dual degree options and collaborations with Biology and Engineering and the social sciences, a trend becoming common across the country.

3. Does this proposed department map with university and college goals?

Dean Crawford briefly outlined the five goals of the University:

1. Offer an unsurpassed undergraduate education;
2. Become a pre-eminent research university;
3. Ensure that the university's Catholic character informs all its endeavors;
4. Create a sustainable culture of continuous improvement and service excellence to support the university's mission;
5. Communicate strategically to internal and external constituents.

Looking at these goals and the college's goals, Dean Crawford discussed how the new department would enhance scholarship and creative activities in core disciplines.

a. Enhance and expand research, scholarship and creative activities in core discipline:

Applied math and statistics are in fact core disciplines now, as will be evidenced at peer institutions. The goal is to make an investment in mathematics as a whole: while there will be a new department (ACMS), there will also be genuine investment in both mathematical sciences, and they will thrive together. The additional faculty and graduate students who will become collaborators will serve to improve core disciplines in other areas, in and outside of the college.

b. Promote and expand interdisciplinary research initiatives, programs, and infrastructure across departments and colleges:

The department created in this proposal is inherently interdisciplinary by its very nature; applied math has been like that and statistics has now become that, while computation has moved into many different areas. This will connect with many different SAPCs and Centers and Institutes. The core faculty starting this venture are already highly collaborative and have demonstrated this expertise across department and college boundaries. There are connections with the IU School of Medicine. The degree options tend to be very interdisciplinary, which in his experience, he has found to be very attractive for dual degree and joint degree options. In addition, the graduate school must grow—it is an important aspect of the growth to a pre-eminent research institution. It will help it will help attract faculty, and it will help the faculty do more research. This is one more possible way in which the graduate school can grow, through interdisciplinary pursuits, while not detracting from any programs but rather enhance existing programs and even bring more opportunities.

c. Offer the most distinctive undergraduate science education:

ACMS will be a heavily research-focused program. While Science as a whole has yet to sufficiently involve all undergraduate science majors in research, this program can do that very well. Its model will present an exceptional opportunity for undergraduates to get that research experience. We want the students to be creators of knowledge, in the end, not just absorbers. It will enable students to be the architects of their curriculum, in choosing how and in what ways they can do their research. It also makes way for topics that can be applied in the classroom with interesting pedagogies, for example those of open-ended problems, computation, real time computation, peer instruction, case studies for modeling, and even studio teaching in some cases where computation can be involved. We can apply the latest education pedagogy in a creative way.

d. Increase the college's visibility internally and externally:

Visibility in the College of Science and other departments can be enhanced, as the department reaches out and gets involved in helping write joint proposals and such. It will enhance Mathematical Science as a whole.

e. Cultivate an environment that embraces our Catholic traditions and values:

In the proposal, social justice is addressed in its work to relieve human suffering as related to the environment and human health. In many programs already in existence, faculty are working on projects with IU School of Medicine, in cancer care engineering, proteomics, injury in infants, and

cardio vascular disease, making the new department a great mission fit. Members of the proposed department have taken part in an ethics workshop held by the College of Science, exploring the ways in which ethics is involved in decision making.

f. Create an outlet where our research and teaching discoveries, inventions, and innovations can benefit society:

Because ACMS is an applied science, the basis for a research outlet is already there. Ideas will be disseminated and translated into the common good, through the resources already in place in Innovation Park and Indiana Clinical Translational Science Institute that we are a part of with Purdue and IU School of Medicine. These open up opportunities for impact on the outside world after the scholarship is performed. Examples include breast cancer and cancer care already going on with this cohort of faculty.

g. Create a culture of continuous improvement:

In accepting the deanship, Dean Crawford was charged with creating a culture of continuous improvement and excellence. The CAP document, attached, is the result of extensive college-wide discussions to formulate consistent policies, with appendices including department-specific items.

4. Is it cooperative?

It is absolutely a cooperative venture with strong interdisciplinary roots, reaching out to all areas of science and engineering and beyond. The tools and algorithms can be used to solve problems across a number of disciplines. Further, this department will be attractive to a wide variety of scholars. We will make a number of concurrent and joint hires—we have talked with a number of people already. In addition, we will create a consulting service for graduate student service. Rather than the traditional TA position, this Service Assistant will be available to work with faculty around campus, to solve problems in these other fields.

We are in the process of designing new courses that will benefit applied math, computation and statistics across the campus. In addition we will make new hires for the department, with attention to connections with on campus research groups outside of the department being given weight. This offers opportunities to search committees and executive committees from other departments to weigh in, providing a great way for other chairs to leverage lines and half lines to bring in new people who would contribute to both departments in some joint or some concurrent ways.

5. Benchmarking—is this department consistent with what our peers are doing:

Dean Crawford performed a significant amount of benchmarking, talking with many people over the last eight months. Looking at the top 20 schools in *US News and World Report*, 15 of the top 20 departments have programs or departments in applied math or computational math and offer doctoral degrees. 15 of the top 20 have at least one statistics department; many have more than one, indication of the importance of statistics to many different disciplines.

- Harvard has an Applied Math group that is in the School of Engineering and Applied Sciences. They have a separate Department of Statistics in the Faculty of Arts and Sciences as well as a Department of Biostatistics in the School of Public Health.
- Princeton has a Program in Applied and Computational Math at the graduate school level. They do not have a department of statistics.
- Yale University has a Program of Applied Math with associated faculty members and offers all types of degrees at all levels. They have a Department of Statistics and a Department of Biostatistics in the School of Public Health.
- California Institute of Technology has a Department of Applied and Computational Mathematics but no department of statistics.
- MIT has a Math Department that has both applied and pure mathematicians, but with two separate chairs with separate administrative reporting lines. They do not have a statistics department, but they have a lot going on in statistics in the Sloane School of Management.
- Stanford has a Department of Statistics, with applied mathematicians in that department, and they offer degrees in applied math through that department. They also have a division of Biostatistics in the School of Medicine.
- The University of Pennsylvania has a graduate program in Applied Math and Computational Science where they offer many types of degrees. They have a Department of Statistics in the Wharton School of Business and a Department of Biostatistics and Epidemiology in the School of Medicine.
- Columbia University has a Department of Applied Physics and Math, a Department of Statistics, and a Department of Biostatistics in the School of Public Health.
- The University of Chicago has a Department of Statistics to which it has recently added 6 applied math positions.
- Duke University has a formal program within the Department of Math for applied math which is associated with a larger NSF-funded center, the Statistical and Applied Math Sciences Institute. They also have a Department of Statistical Science.
- Dartmouth does not have significant programs or departments in either applied math or statistics.
- Northwestern University has a Department of Engineering Sciences and Applied Mathematics and a Department of Statistics.
- Washington University has a Department of Systems Science and Applied Math and a Division of Biostatistics in the School of Medicine.

- Johns Hopkins University has a Department of Applied Mathematics and Statistics and also a Department of Biostatistics in the School of Public Health.
- Cornell University has a large Center for Applied Math with faculty from many departments, offering doctoral degrees. They have a Department of Statistical Sciences, a Department of Social Statistics, and a Department of Biological Statistics and Computational Biology.
- Brown University has a Department of Applied Math and a Biostatistics Graduate Program in the School of Medicine.
- Emory University has a Department of Biostatistics & Bioinformatics in the School of Public Health, but no applied math.
- Rice University has a Department of Computational and Applied Mathematics and a Department of Statistics.
- Vanderbilt University has a Department of Biostatistics in the School of Medicine but no applied math.

Dean Crawford recapped that 15 of the top 20 schools have either applied math or statistics departments or programs. 15 institutions have at least one department of statistics. The NSF has created the Statistical and Mathematical Sciences Institute (SAMSI) at Research Triangle Park, North Carolina, which was ultimately connected to Duke University.

Several institutions have examples of combined departments: Stony Brook has a Department of Applied Mathematics and Statistics; Johns Hopkins University also has a Department of Applied Mathematics and Statistics. At other institutions, statisticians can be hired in pure math, in applied math, in engineering.

6. Do we have the type of faculty to start such a new department?

Dean Crawford expressed great confidence in the faculty who proposed this new department, who have deep domain knowledge in the field. They have a strong record in cross department and cross college collaboration. They have a collective 40 years of university administrative experience. The young faculty members, who are just terrific, are from Stony Brook and from Brown, each of which has applied math departments, so the young cohort really understands this space well.

7. Do we have the resources for the start up and sustainability?

Dean Crawford gave a brief overview of budget details, which is covered extensively in the proposal. There are 6 faculty as well as 3 statisticians and 2 professional specialists/statisticians. The resource details are spelled out in the budget. One way to sustain the department is a professional masters program which will be very successful because of the outstanding prospects after graduation. The NSF has called for the development of professional masters programs.

Dean Crawford noted that it takes work to raise money for chaired faculty in all departments in the current economic climate. In the past one and a half years, two endowments for chairs, in mathematics and biology, have been obtained. That has been encouraging, and the College hopes the trend will continue. The proposal is prudent and entrepreneurial with the modest resources, and it has a sustainability plan in place.

The College of Science has recently received a gift of \$100,000 to expand activities in actuarial science, which will be shared between Math and the new department, if it is approved. This is a particularly welcome gift as students are interested in actuarial science after graduation. The new department will also contribute to a number of block proposals, because of the interdisciplinary focus. There are restricted funds which are available to be dedicated to graduate fellowships for scholars outside the department who want to be involved in it, such as engineers or social scientists.

The initial size of the department includes 7 faculty, including one from CRC, and 5 new hires. The starting point of 12 may seem small but in comparison to peer institutions, it is not off the scale. Brown University, a top ranked institution, has 23 faculty; the University of Colorado, Boulder has 16 in Applied Math and 44 concurrent appointments. Stony Brook, in the top 5 departments, has 20 and the University of Washington, also a top department, has 12. This type of department is often smaller than average because it will typically have a lot of concurrent and joint appointments.

8. Could the same goals be accomplished with a simpler administrative structure, such as a center?

The autonomy of this arrangement is important; it is a core discipline, which makes it a bit different than 'nano' or 'energy' or 'environment.' In addition, establishing a department in this core discipline brings ND in line with our peers. This discipline involves many different degrees which will draw on a range of interesting faculty hires, but it can be more challenging to hire faculty for centers and institutes. The national conversation on best practices for centers/institutes points to some of the troubles arising from the center structure ("Competing in an Era of Big Bets" National Best Practices Report, University Leadership Council).

Operating as a free standing department at ND will best encourage the department to grow and flourish and will create more interdisciplinary activities. It will permit more coordination of group proposals in conjunction with the Vice President's office. Another aspect developed will be an efficient, streamlined departmental unit.

9. Can the goals be accomplished by adding faculty to an existing department?

The professional cultures of ACMS and 'pure' Math are very different. The graduate students in these applied fields often play a critical role in research projects involving team mentors from

multiple departments which we want to enable. The papers may have many co-authors from different places, including from fields outside applied math fields, such as psychology or economics journals. The grants are more important in applied math than pure math, and tend to have big groups as in an experimental science field. Thus cultural differences argue for this autonomous administrative structure for ACMS rather than a combined structure.

This analysis should not in any way be construed as a negative assessment of the Department of Mathematics, which is a 'terrific department' with a strong faculty; this separate structure will allow both fields to flourish.

10. Will the department benefit the careers of the faculty members who will join the department?

Promoting interdisciplinary work here of like-minded faculty will be accomplished; recruiting excellent graduate students who are focused on applied math, computation and statistics will also be accomplished. The growth in activity in the ACMS disciplines places the faculty at the center of a growing area of study, with prominent connections across the campus.

11. Can this be done with minimal negative consequences for other departments?

From the standpoint of Mathematics, the size of the department is currently 42, which classifies it as a large department, and it will be 36 after the proposed department is formed for a student population of about 11,730. Harvard, for instance, has about 20,000 students and a Math faculty of 26; Columbia University has 23,000 students and 26 Math faculty; Duke has 14,000 students and 21 Math faculty; Northwestern has 18,400 students and 27 Math faculty (reported in *US News & World Report*, 2008 enrollments). Therefore, 36 faculty in the Department of Mathematics and ultimately 12 in ACMS will allow mathematics as a whole to continue its strong growth at ND.

Dean Crawford talked about his commitment to growing mathematical sciences as a whole as the quantitative nature of things will continue to be very important in the future in many scholarly areas. Two postdoctoral positions have already been created for the Department of Math, an accomplishment in this economic environment. We have funded student travel and conferences. Working with Mathematics, we've been developing an idea for an institute to which we are committed. The Graduate School has been very supportive of the development of this proposal in every way, keeping the graduate lines in the Department of Mathematics stable, which gives math an effective increase.

The new chair for the Department of Mathematics is Prof. Matthew Gursky who will ably lead the leadership team in that department. The result will be two halves of a greater whole, in the ACMS department and the Mathematics department.

CONCERNS expressed by faculty:

1. Will this create a situation similar to that created in the split of the Economics department?

This situation is dissimilar to that in Economics; both departments will be fully resourced, enabling both to grow separately and together. Members of each field are very excited about the future, and Crawford asserted that he made his commitment to both departments very clear to each department leadership team and to both faculties. Mathematics should not be worried, as it is a very strong department doing world class research; nearly 70% of faculty maintain active NSF grants, a higher rate than at some institutions which are ranked higher by NSF.

The department has effectively built on the investment made there in the last year and a half to continue to grow. The logic graduate training grant in Mathematic is a strong program at ND. The program managed by Prof. Connolly takes undergraduates into graduate courses as juniors, and eventually enables them to place math graduates in the best graduate schools in the country. Math has earned two awards from NSF's 'Enhancing the mathematical Sciences Workforce for the 21st century program.' There are only 5 other universities which have that record of accomplishment.

Math also has strong chaired professors, such as Prof. Karsten Grove and Prof. Francois Ledrappier, who are extraordinarily well known scholars in their fields. In addition, there is an extremely strong cohort of young faculty, who are prolific writers published in highly regarded journals and who are well funded; Professors Budur and Galvin are representative. There are many strong faculty in mathematics.

Prof. Matthew Gursky will provide strong and able leadership and was voted into this position by his colleagues by a very significant measure. Prof. Gursky has demonstrated a collaborative style of leadership; he is someone who seeks to help in any given situation. One example of Prof. Gursky's strengths: Dean Crawford noted the extensive work he has been doing in conjunction with others (Father Tom Streit, Father Jim Foster, Sister Kathleen Cannon) to develop programs and seminars bringing the Catholic character and Catholic social teachings into the foreground in Science. Prof. Gursky really understands our Catholic character in a deep and meaningful way, and resonates with the College's vision of integrating science more deeply into our distinctive Catholic tradition. Dean Crawford mentioned a recent contribution by Prof. Gursky to a College publication on Catholic character in Science.

Finally, there is simply no way that a major university is not going to have a 'pure' Mathematics Department. It is so important to a wide range of disciplines, as the examples of the top 20 schools demonstrate. In addition, the new department will begin with very strong faculty, two chaired professors and great young faculty, so they are in good shape as well.

2. Will this create a drain on resources for the Department of Mathematics?

It will not be a drain, absolutely not, but instead offers an opportunity to do 'something big' in Science that will benefit everyone.

3. Will this damage rankings in the Department of Mathematics?

The department is currently in the top quartile. Dean Crawford explained that the *US News & World Report* rankings of mathematics departments are based solely on a reputation survey rather than, as in Law, Engineering, and Business for instance, a series of metrics which also include a peer reputation metric. Faculty are asked to 'rank Mathematics at XXX institution.' Therefore, all mathematics fields are pulled together; there is no separation of applied and 'pure' fields for the purposes of this ranking. The NRC ranking does provide institutions with the option for separating departments. There should be no impact on the ranking of Mathematics.

4. What was the process of development for this proposal?

Dean Crawford explained the genesis of the department and the ensuing process for the development and drafting of the proposal.

On arriving at ND, Dean Crawford immediately identified a lack of statistics on campus, and he considered the future of ACMS at ND in light of the standard set at top 20 institutions. The Dean approached some faculty with the idea of an ACMS-like department; at the same time an Ad Hoc Committee on Statistics was considering a similar idea to address statistics and in communication with the Provost about their recommendations; Prof. Mark Alber and Prof. Andrew Sommese were members of this committee. From these initial conversations emerged an idea of a synergistic, cooperative, interdisciplinary concept that would also have deep scholarship in these areas to benefit ND.

Dean Crawford reviewed the timeline for the development of this proposal. Professors Buechler, Alber and Sommese approached him at the end of May, 2009. After a number of conversations among these math faculty and with the Provost, the Dean presented a brief "White Paper" proposal and then a draft proposal to the Provost in August 2009. At the Provost's Deans' Retreat, August, 2009, the Dean presented the proposal draft to his colleagues who were very supportive of going forward with the concept.

On September 16, 2009, the proposal authors and the Dean met with the Provost and the Ad Hoc Committee on Statistics, with broad representation across campus. The committee did not recommend a new department structure because they did not know this was possible due to the

perception that such an option would be too expensive; however, the committee did endorse the idea and considered it a viable option for increasing statistical expertise at ND.

On September 22, 2009 the draft proposal was transmitted to the Department of Mathematics and subsequently released to the associate and assistant deans and department chairs in the College of Science (DAC). Following this were extensive discussions between the Dean and members of the Department of Mathematics about the impact of the proposal on the department, on ND mathematics overall, and on the University and the growth of mathematical sciences as a whole. The Dean met with each department faculty member individually, and with some twice. Members who were not on campus were communicated with via email. Crawford stated he did a lot of due diligence in this area. Beginning in August, also, he initiated the ongoing process of benchmarking the top 20 schools, and with NSF representatives and other funding agencies.

In October, 2009, the Dean met twice with the Department of Mathematics' committee on Appointments and Promotions, and he met twice with the faculty as a whole. The Provost also met with the faculty in November. In December, the Dean met with the faculty in the College of Science, which included the faculty of mathematics. At the same time, Professors Alber, Sommese and Buechler discussed the proposal with colleagues around campus, including the deans of all of the colleges and department chairs throughout Science and in the social sciences. The proposal was submitted to the External Science Advisory Council where it was greeted enthusiastically. In late October, 2009 it was submitted to the College of Science Council and approved unanimously, with one abstention.

The PIs of the proposal met with faculty from all areas of campus throughout the year. The Dean consulted with Prof. Don Pope-Davis in preparation for presenting the proposal to the Academic Council. Prof. Pope-Davis suggested some supplementary materials, in particular in reference to the CAP document. The Dean met with the IU School of Medicine faculty members and CEOs of local hospitals because of the importance that the department will play there.

The proposal was submitted to the Academic Council on December 22, 2009. The Dean met with the Faculty Affairs subcommittee on January 19, 2010 and responded to the Council's suggestions, which were delivered in written form on February 4, 2010. Corrections were made and the proposal was submitted to Prof. Pope-Davis on February 16, 2010. The Dean also met with an ad hoc subcommittee of the Academic Council on February 25 and with the Faculty Affairs subcommittee as a whole also on February 25. The Dean responded in writing to all concerns and suggestions. Also on February 25 the Dean met with Prof. Rigby, of the Faculty Senate, individually. Based on all these interactions, corrections were made and submitted back to the Academic Council on March 2, 2010. The complete and revised version of the proposal was sent to the faculty of the Mathematics Department on March 8, 2010, following word from Prof. Pope-Davis that the proposal would be on the Academic Council agenda for the March 18, 2010 meeting. DAC

members also received all of this material. In addition, this full and revised version was sent to the Full Academic Council on March 15th, including copies of comments and suggestions with responses appended.

The Dean also met with two student senators on March 16, 2010 in the evening. He noted his appreciation that the students were open to this late meeting time, as a function of the Dean's schedule. He apologized that he was not able to meet with the full Student Senate prior to April, due in part to travels. He thanked the students for their cooperation and the attention they have given the proposal.

The Dean concluded by noting that there were a great many conversations around campus, working with everyone to make the proposal as strong and clear as possible. The Dean stated that he believes he has followed all the proper protocol, incorporating advice from colleagues in the process. He asserted that he has reached out to all concerned parties on campus, the different constituencies who might be impacted, to get feedback and hear concerns. He reported that he has met with the proposed new department chair, Prof. Steven Buechler, and Professors Gursky, Gekhtman and Knight, ensuring that lines of communication are established and seamless.

5. Can the Department of Mathematics choose to hire applied mathematicians?

This proposal should not detract from the options for Mathematics; indeed, it will further collaboration and joint appointments. There is already collaboration in subcommittees. There will now be two great departments offering courses in mathematics. Where there is overlap, it should be feasible to work them out collegially. The leadership of each department has been a pleasure to work with.

6. Can students transfer between Math and ACMS?

At both the undergraduate and the graduate level, the process of transferring is being designed to be as easy as possible; it is done all the time in other disciplines, as well.

7. Are the library resources adequate?

A librarian worked with Prof. Buechler, and the resources are available in the College of Science to support the needed acquisitions and continuing needs.

In conclusion, Dean Crawford noted that he has not discussed the 'nuts and bolts' of the proposal as each member has had an opportunity to review a copy of it. He reaffirmed that the College of Science is excited about this proposal and committed to the plan; it meshes with his own passionate

commitment to integration in Science. He said it has been a pleasure working with the many parties who have been involved in the development of this idea.

He noted that it would be impossible to thank the many people involved; he mentioned a number of key figures. He thanked Prof. Gursky and the entire Math department which have been a pleasure to work with. He mentioned the helpful assistance of the associate deans and chairs, and the College Council. He thanked his dean colleagues. He mentioned the Science faculty and the entire faculty from around the campus who have given input into the development of this idea. He thanked the Ad Hoc Committee on Statistics for its steadfast work. He thanked the Faculty Affairs subcommittee, in particular Prof. Powers, for their helpful insights which strengthened the proposal. He thanked Prof. Rigby for his flexibility in arranging a meeting time, and the student senate for their flexibility.

Questions:

Cheri Smith, Hesburgh Libraries, expressed concern about library funding for this undertaking. Dean Crawford said the question of library resources to support the new department was an issue that was broached late in the development of the proposal. Ms. Smith noted that she has talked briefly with Mr. Parker Ladwig, Mathematics Librarian, to express her concerns. She said there is not adequate funding to support statistics in Psychology, let alone to support statistical work in multiple disciplines, in terms of both materials and staff support. Ms. Smith recommended adding a section to the proposal which specifies the kinds of resources needed and the source of funding for those resources. Dean Crawford apologized for the oversight which had been identified only recently but he did address it in his comments today; he noted that the discussion has been started with Mr. Ladwig and that the proposal will include details about library resources. He thanked Ms. Smith for her observations.

Dean John McGreevy congratulated Science on an excellent proposal. He offered support of Dean Crawford's comments that many of the social science disciplines in Arts and Letters—such as economics, sociology, political science and psychology—are very excited about the proposal and see lots of opportunity for collaboration. Arts and Letters has been involved in the proposal at the faculty, graduate and undergraduate levels.

Prof. Dennis Doordan asked about impact metrics. He quoted from page 7 of the proposal, which speaks of the professional culture of interdisciplinary research that places focus on the significance of impact independent of the field in which the research takes place. The issue of how you measure impact arises because in the CAP document which accompanies the proposal indicates that 'the primary input for evaluation will be published scholarly work.' Prof. Doordan noted that 'published scholarly work' is a narrow focus in measuring impact. He asked if there is an articulated understanding within the College currently about what constitutes impact, so that a young faculty

member coming up for tenure or promotion would have some confidence that there is a shared understanding of what constitutes impact.

Dean Crawford said this is a good question, one that could be addressed to the PAC as well. In these changing economic times, funding and large grant proposals that focus on interdisciplinary work face challenges, which make it more complex—not more difficult—to evaluate faculty for tenure who perform in other areas. He provided some insight into the way PAC cases are handled. In ‘pure’ mathematics journals, the impact factor does not play a role whatsoever because there is a smaller cohort involved in the calculation, so journal rankings are used instead to identify top publications. Prof. Doordan said he would like to move the discussion away from publications altogether to ask if there is some understanding of impact if, for example, a faculty member were involved in a project through Innovation Park that is separate from counting the number of pages published.

Dean Crawford said that in the situation of interdisciplinary disciplines, when an idea becomes, say, a patent or an invention, that outcome is a very important part of output and it is scholarly work in a sense. Translating the scholarly work to the next level, in the ‘outside world,’ creates benefits that can be recognized. Dean Crawford said that at ND work and resources have been invested at Innovation Park, and faculty are engaged there. In the case of the proposed department, faculty members concerned with the new department have done work with the cancer care initiative at the Walther Center, and Purdue University, which represents the next step outside the campus world. They have done work with the Indiana Clinical Translational Science Institute, which is our partnership with all of Indiana for the NIH. In addition, there are some invention exposures in conversation with folks interested in other agencies. In the current CAP document (not in the last CAP document), inventions are part of the package. Thus, these will count in impact. Counting is done differently at different institutions. Some institutions may count inventions toward impact, while others will count it as service. Dean Crawford noted that working a patent through the process can take a tremendous amount of faculty time; Prof. Doordan concurred with that, noting that the challenge of interdisciplinary research is hampered by this fact that work produced may be counted as service rather than research. Dean Crawford said one could also express it as ‘a great opportunity’ here at ND.

Prof. Tom Gresik, Faculty Senate spoke about the Faculty Senate’s response to the proposal. He noted that the Faculty Senate received the final copy of the proposal on February 17, 2010. The assessment of the proposal reached two conclusions:

1. The Senate agrees with the need to increase the footprint of ACMS at ND.
2. As of its March 2, 2010 meeting, the Faculty Senate felt that it had not been provided with adequate time to fully vet the proposal. The Academic Affairs committee had less than two weeks to study the proposal and talk to affected individuals. During that time, a number of issues were raised that simply could not

be resolved quickly, notwithstanding that Dean Crawford made himself very generously available. As a result, the Faculty Senate recommended today's vote be postponed. Since March 2, 2010, several members of the Faculty Senate worked to learn more about the issues associated with this proposal, which Prof. Gresik shared with the Council. In the Faculty Senate's initial review, it was not clear whether this proposal was setting up a resource battle between the two departments or whether it was creating the opportunity for each group to make new investments in line with its comparative advantage. The efforts Dean Crawford has made to increase funding to Mathematics, in important areas such as endowed chairs and postdoctoral positions, are clearly consistent with the ambitions articulated in the proposal and by Dean Crawford to help both Mathematics and ACMS to flourish. In that regard, the new information that was obtained has been encouraging.

However, the limited review time and the limited access the Department of Mathematics has had to the full proposal remains a serious concern for the Faculty Senate. The fact that Mathematics was not provided a copy of the full proposal until roughly the week of Spring Break (March 6-13, 2010), belies in part the important goals of collaboration that are articulated in the proposal. While Dean Crawford is to be commended for the tremendous efforts he has made to talk with many different groups, one of the groups most directly affected by the proposal, the Department of Mathematics, and a number of the faculty there have noted a number of reservations and concerns because they feel they have not had a sufficient opportunity to provide feedback to the full proposal. Based on the information received since March 2, 2010, and on feedback received in the last few days, including from members of the Department of Mathematics who continue to express opposition to this proposal, Prof. Gresik expressed his belief that delaying today's vote would not serve a constructive purpose. However, he stressed that the opportunity should be taken to go on record to ask the Administration to work with all channels of faculty governance, including the affected faculty, to insure that future proposals that come to Academic Council are distributed far enough in advance to allow for meaningful feedback. To the extent that there was great effort made to talk to all stakeholders, the groups most directly affected deserve a greater opportunity to see the full proposal and offer feedback. The Faculty Senate looks forward to working with the administration to improve faculty input on future proposals. At this point, the consensus is that this is a constructive proposal that should go forward. Prof. Gresik reiterated that there are concerns that there were gaps in the faculty governance input process.

Dean Crawford expressed thanks to Prof. Gresik for his remarks. He emphasized the degree to which he has worked very hard to enable Mathematics to grow. The resources which are funneled to Mathematics, and the team in place to provide leadership in this department, will ensure a significant recharged effort moving forward. Dean Crawford said there is no evidence of a resource drain from Mathematics. Dean Crawford reaffirmed that he followed the process all the way through, talking with many constituencies, and he said that he believes his team did a good job of connecting with the necessary people. He emphasized that all the work was about supporting the Mathematics programs. He sought to reassure members, in this public setting, that he has kept the

needs of the College in mind. The connections between different disciplines, such as those with Engineering or Business or social sciences for example, have been ‘incredible.’ The growing relationship between Law and Engineering, and between Science and Arts and Letters, is very satisfying to Dean Crawford. The goal of integration has been expressed in a wide ranging connection with people across the campus. He acknowledged that the future may provide an opportunity to better streamline the process so that getting a similar kind of proposal to the Academic Council in a more timely fashion will become a reality. Prof. Gresik responded to Dean Crawford’s words, noting that it is clear the ambitions and goals of Science are to work to assist both of the departments to grow and flourish. That is a wonderful testament to the work of Dean Crawford and others. Prof. Gresik stressed that the point he wished to make on behalf of the Faculty Senate is that an aspect of faculty governance was missed.

Provost Burish addressed Prof. Gresik’s remarks. He said he appreciated the suggestion that the discussion moves forward today, and he agreed to revisit the question of faculty governance, perhaps at a faculty committee. One thing to consider is that the Academic Council saw a version of the proposal and made a lot of suggestions for change. The Mathematics Department and others saw an earlier proposal. If the revisions were to be circulated back around through all concerned parties it would only cause undue delay to the forward progress of a proposal. There may be an appropriate way to keep drafts circulating until there is something that everyone—or at least most parties—is happy with. It is a legitimate topic for discussion; the question is: what group might think about this and make suggestions—perhaps the Faculty Affairs Committee of the Academic Council. Burish assured members that this issue will not be dropped.

Dean Greg Sterling offered his commendation of the proposal. He referred to a discussion at the Graduate School Council about a proposed minor in Quantitative Psychology. The discussion pinpointed concern for a perceived lack of campus support of statistics. Dean Sterling noted that the proposal before the Council today offers a meaningful way to address that need which is felt in disciplines in the social sciences and engineering and in science. He also thinks that the use of graduate students as proposed is excellent. And the attempt to give some coherence to computational science, which is currently scattered throughout many different departments in the university, will give it prestige. Dean Sterling did not perceive the proposal as a diminution of the Department of Mathematics; rather, it will actually enhance Mathematics, solving some of the major problems that exist throughout the university in a way that will benefit all.

Prof. Panos Antsaklis offered his congratulations particularly to Prof. Steven Buechler and his response to the numerous suggestions offered by the Academic Council. He noted that the response of the Faculty Senate should be seen in the context of the fact that many faculty members had not seen any versions of the proposal before they saw the draft presented to the Faculty Senate on March 2, 2010. The final document is a good one he stated. He asked a question about departmental review on p. 21 of the proposal. The dean of the College of Science will organize a

review of the new department after three years in order to gage the progression of the department. Prof. Antsaklis suggested adding language which indicates that the review will include people from other Colleges because by definition this is an interdisciplinary venture. It affects engineering, business, and arts and letters.

Dean Crawford acknowledged the value of this suggestion and agreed to add such language.

Dean Peter Kilpatrick, Engineering, offered his commendation to Dean Crawford for an outstanding document. He noted that many faculty members in Engineering were consulted, and he noted that many will be affected positively by the proposed department. He views the initiative to be one that sets the standard for interdisciplinary departments within the College. He offered support, as well, to the remarks of Prof. Gresik concerning faculty governance while recognizing the reality of the number of moving parts in putting a proposal like this together. He supported the extensive work done by Dean Crawford to apprise the Mathematics faculty; this occurred in a number of ways, such as through the CAP meetings, the faculty meetings, and the one-on-one meetings with faculty as well as the early version of the proposal. The point is well taken about the final proposal; nonetheless, Dean Kilpatrick expressed his approval of the proposal.

Ryan Brellenthin, Student Government, offered his congratulations on the proposal document. He echoed some of the concerns about process which others have mentioned. Students met with Dean Crawford in the evening of March 16, and they appreciated the Dean's willingness to add this meeting to a busy schedule. The students would like to make sure, going forward from this proposal (and the proposal, February 25, 2010 AC meeting, to eliminate the Department of Economics), that it is understood that the students would like to be collaboratively included in these kinds of discussions of the academic life of the university. He emphasized that the students are not interested in obstructing the process but rather are eager to take an active part in taking ownership of their academic experience. He offered to work with concerned people to study the nature of the undergraduate academic experience. He stressed that in future situations, the undergraduates be including among concerned constituencies.

Prof. Seth Brown, Faculty Senate, asked about the tenure implications should these two departments ever be re-fused into one. Noting that he understands that the origins of this proposal are very different from the situation in the Department of Economics, Prof. Brown suggested that in fact, this proposal represents an experiment whose result may not be that which is anticipated. It seems perfectly reasonable that in 8-10 years, an assessment determines that the plan has not worked out, for whatever reasons. Under those hypothetical conditions, Prof. Brown asked whether there has been any discussion about the tenure status of the faculty in the two departments.

Dean Crawford said that this issue had been briefly discussed with the Provost, leaving the issue to be addressed at the future time if need be. The proposed creation of a new department ACMS, with members from the Math Department moving into the new department structure, is a very different case from that of the Economics department. Dean Crawford said that in principle anything could happen in any department on campus at any time; this experiment is not unique in that sense. Departments come and go. Prof. Brown agreed with that point in principle; in practice, however, while it is inconceivable that the university would eliminate the Department of Mathematics, it is easily conceivable that the math departments would go from two to one. By this splitting, he suggested, the likelihood that one of those departments will cease to exist is 'dramatically increased.' In the case of Economics, all the faculty members present when that department was split received a letter indicating that should the department be eliminated, their tenure was guaranteed in the College of Arts and Letters. He asked if there had been any such promise made to the concerned faculty in this case.

Dean Crawford said that it is anticipated that something similar will be done in this case. Provost Burish said that he did not think it likely that the Department of 'pure' Mathematics will go away. In this case, the 'home' department is the natural department to remain. He noted that the faculty have not expressed concerns about tenure; there was no response because there was no concern to which to respond. If the ACMS faculty did express concerns, then administration would be ready to discuss it with them. It may be in this case that some faculty would elect to leave the College of Science, to move to Econometrics or Psychometrics for instance. There might be differing views for current faculty and for new hires about where one would choose to settle under the circumstances of the elimination of a department. The provost concluded by saying that he believes it has not been discussed because it hasn't been asked by any of the concerned faculty, to the best of his knowledge.

Prof. Paul Huber offered some observations on this question. He noted that it was briefly discussed in the Faculty Affairs subcommittee, where it was determined that formal language would be inappropriate in this situation, in that it would seem to put a 'black mark' on the proposed department from the start. The committee decided it would be better for the department to go forward from the beginning with every expectation that it is going to flourish. There would be no restrictions put in place; the decision was not debated for very long, he reported.

Prof. Brown said that his understanding is that in the absence of any explicit statement guarantees by the university, tenure status would be governed by Article 3, section 7a, which deals with discontinuing a department. The provost said that he could not confirm the text of the relevant article. Prof. Brown noted that the affected faculty might be interested in reviewing it.

Prof. Brown next asked about the size of the proposed department. He noted that in today's presentation, Dean Crawford benchmarked departments which have a median faculty size of 18.

The proposed department will have 9 faculty lines. Dean Crawford noted that this is the starting point for the department, and, as with all the colleges, the College of Science has a strategic plan to grow and expand, which will include the proposed department. He explained that the ranked departments which provide benchmarks are mature departments; they are not 'gigantic' and yet they are successful and accomplished according to the rankings. Prof. Brown said his concern is related to an issue raised by Prof. Gresik about resource competition. In the proposal of 9 faculty, competition for resources is clearly not the case, but if it is going to expand, then resources which might support some other aspect of the university will be diverted to support of this expansion. Dean Crawford said he did not see this as a zero-sum game; that argument might prevent the commencement of any new project. Additionally, the record in Science is a trajectory that it is hoped will continue, for this proposed department and for the College of Science generally as well as all other departments whose deans propose growth in their departments.

Finally, Prof. Brown addressed the process of developing this proposal. He commended Dean Crawford for trying to touch all the bases. The March 8 date, when the Department of Mathematics got the final proposal, and the March 16 date when the Dean met with the students stand out as potential indicators that collaboration was not as strong as might be hoped. He expressed concern that the long hiatus generated some unease between the two departments and may have diminished the amount of collaboration. The advantage of bringing in the students at an earlier date and integrating the whole of the mathematics faculty on a more continual basis would be that a lot of the details of the proposal would have been worked out to a better degree and would have better quality and also would have generated better buy-in among the students and the faculty. He addressed the Provost's question, what to do about that, by proposing that perhaps in this case the process was tripped up by the habits of confidentiality. He agreed that in many cases it is appropriate that documents moving through the Academic Council are held confidential; in this case, Prof. Brown suggested there was nothing particularly sensitive in the proposal and so it would have been possible to have had much more frequent consultations with the faculty of the Department of Mathematics. It is something for the Academic Council to be aware of, to use confidentiality when it is important, but to be more open when confidentiality might be detrimental.

Dean Crawford addressed Prof. Brown's concerns. He said the proposal went out in a shorter version to all parties in Sept, 2009. Prof. Pope-Davis provided a template which added supplemental materials to the original proposal. He contended that the final version of the proposal would not have blindsided anyone, as it was quite similar to the short version disseminated in Sept. 2009. He noted that approximately half of the thick document is composed of the CAP document, which is in the possession of the Department of Mathematics also since they are also working on it as a department. The concept of the proposal was in fact 'out there.' It grew as it progressed through Academic Council, but it was largely increased by supplementary materials. He spoke briefly about the challenge of the new and of change. He reminded members that the

math faculty had access to the basic proposal in September and that he continuously was speaking with members of the faculty from September until March, when the final version of the document was delivered to the Department of Mathematics. In fact, he reminded members that in that period he was involved in brainstorming new ideas for the Department of Mathematics, such as institutes. He and Prof. Gursky have planned to call a transition committee composed of faculty from each department, and including the graduate director and the undergraduate director who have talked through curriculum issues which has gone well.

Prof. Steven Buechler was invited to comment. While it is unfortunate that there was a long lag time between when the Math department saw the first draft and when they received the final version, all the faculty have had opportunities to talk with one another through this process. He said that the math faculty have had numerous 'hallway' or informal discussions of issues related to the transition which gave faculty an opportunity to express response to topics. For example, the issue of recruiting graduate students for the new ACMS department has been discussed, and the Department of Mathematics has agreed to and executed a plan to appoint those students through their program, with agreement that those students will transfer to the new department if it is approved. There has also been discussion of an issue of resources since Math is very dependent on TAs. Six students will be moving to the new department, and in the transition period, they will perform some TA duties for the 'pure' Math courses to compensate for shortages in staffing course sections. The major requirements for the new undergraduate program have been fleshed out, and there have been informal discussions with Prof. Gursky and Prof. Gekhtman, the DUS, about how the two programs will relate to one another. These issues indicate the kind of details which have been discussed as part of the effort to insure the two departments function well separately and together.

Concern about what is contained in the proposal arose because it was not available to be seen for a period of time. This concern is understandable. Prof. Buechler noted, however, that he would be hard pressed to identify any element of the proposal in its current form which would be a surprise to the faculty in Math. All the initiatives that are contained in the proposal were identified in the planning phases, either from the initial proposal or from the subsequent discussions. He said concerns will die down as the faculty have a chance to look at the proposal.

Prof. Matthew Gursky was invited to speak. He said it would have been preferable to receive the full version of the proposal at an earlier date, but he concurred with Prof. Buechler that there is nothing surprising in the final version. He also spoke about the discussions between the leadership teams of each department, which have been ongoing since at least December, 2009, addressing transition issues of concern to both graduate and undergraduate programs. He said that a different method might have allayed fears, but the two departments have been working very closely to make sure the transitions happen smoothly.

Dean Carolyn Woo, College of Business, offered her congratulations to Dean Crawford on an incredible proposal. She noted that Dean Crawford exemplifies an effective collaborative style, one which is also entrepreneurial. Finally, Dean Woo spoke about her concerns for the excessive amount of work which needs to be done to effect a proposal such as this which Dean Crawford has presented. She praised his persistent and comprehensive work, noting that even so, he still was not able to meet everyone's expressed needs. This cumbersome process for beginning a new venture limits the university's ability to be creative and innovative. The process needs some careful and thoughtful streamlining which will better serve both the university and the students.

Prof. John LoSecco, one of the elected members of the College of Science to the Council, spoke about the placement of this particular department in the College of Science. He suggested that it might be more appropriate to house this department in the College of Engineering. Most mathematics departments have both applied and pure foci, as ND's department had and will continue to have. In universities where applied math exists, it is generally found in the School of Engineering; he noted briefly that some of the institutions cited by Dean Crawford as benchmarks fit this model. He said that the current practice at ND also fits this model: applied math is practiced by Engineers, as represented by the two applied mathematician Engineering faculty who are members of the Academic Council. He stressed that there is a great deal of expertise in applied math in Engineering already, equaling or even exceeding the level of expertise in Mathematics itself. Thus there is some indication that Engineering already has an investment in applied math. Finally, he offered some quantitative support of his argument. Several years ago, Prof. LoSecco participated in reviewing graduate applications for the Center of Applied Mathematics graduate fellowships – one of the ways that applied math is supported by ND. The very large majority of those applications came from students in Engineering. It seems that there is a culture of applied math at the university, and it is in Engineering. The issues of promotion and the criteria for promotion which have been raised in today's discussion would be more easily resolved in the applied math culture of the College of Engineering than in the pure science venue of the College of Science. This proposed department is much more aligned in goals and cultures with that of the applied venue of Engineering.

Dean Crawford thanked Prof. LoSecco for his observations, but noted that he disagreed with this analysis. He drew on his personal experience, noting that he has a math degree to accompany his physics degrees, and has been dean of Engineering at another institution and now dean of Science. At his previous institution, he held a joint appointment to Engineering and Physics. So he feels qualified to speak to this issue of culture in the various sciences. He asserted that applied math is a science, drawing on a definition of statistics disseminated by Princeton University. He also spoke about the contextually different meanings for 'pure' and 'applied' work, noting that much scholarship in biology could be described as applied, and that a pure mathematician might view the work of a nuclear physicist as applied science, while that nuclear physicist might view the work of a biophysicist as applied. Because it is a matter of perspective, Dean Crawford suggested that the

characterization offered by Prof. LoSecco is inaccurate. Second, he reminded members that Engineering had representatives in all discussions and on all committees throughout the process of developing this proposal, and Dean Kilpatrick, Engineering, was part of the process throughout. Finally, the College of Science is eager and active in reaching out to other disciplines, with 20 concurrent appointments from other Colleges currently. This is a practice which will continue in this new department.

Kevin Barry asked if the Center for Social Research will have a role in the new department; Dean Crawford said that the department is working with all the social sciences.

Dean Woo called the question. Dr. Burish asked for a vote of approval. The proposal was approved with two nays.

As time had expired, the meetings of the subcommittees were postponed, and the meeting was adjourned.

ADDENDUM: Fr. John Jenkins approved the creation of the Department of Applied and Computational Mathematics and Statistics on March 24, 2010.